COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 4113

Konkoly Observatory
Budapest
15 November 1994
*HU ISSN 0374 – 0676*

# A DETECTION OF MOVING BUMPS IN THE EMISSION PROFILES OF THE Be STAR FX Lib

This star has a long history of spectroscopic observations. Since 1932-35, its shell become active. Long-term variations of the radial velocity of the shell absorption lines and of V/R ratio of Balmer emission lines are cyclic (Faraggiana, 1971; Delplace and Chambon, 1976; Aydin and Faraggiana, 1978, Hubert-Delplace et al., 1983). Its H$\alpha$ profile also underwent rapid changes on a time scale of days as well as long-term changes on a time scales of years (Aydin and Faraggiana, 1978; Slettebak and Reynolds, 1978).

A series of CCD H$\alpha$ spectra of the star were taken using the grating spectograph of the 2.16 m telescope at the Xinglong Station of Beijing Astronomical Observatory during 1994 April-June. The detector was a CCD with 512×512 pixels. The reciprocal linear dispersion of the spectra was 50Å mm$^{-1}$ at H$\alpha$. One pixel corresponds to 1.35Å. The observational and data reduction techniques have already been described by Guo and Guo (1992). The following changes can be found from these data:

1. Night-to-night changes occur in the H$\alpha$ emission profile. Figure 1 shows three H$\alpha$ profiles which represent the mean profile obtained on 1994 April 27, 28 and June 25 respectively. It can be seen from the figures that 1994 April 27 H$\alpha$ profile appears as a double emission, but one day later, the H$\alpha$ profile had three emission peaks. While in the H$\alpha$ profiles of $\eta$ UMa and $\kappa$ Dra which were observed in same two nights, were not found any changes. This demonstrates that the H$\alpha$ profile changes of 48 Lib are reliable. It is worth noting that the 1994 June 25 H$\alpha$ profile become again a double emission peak but the violet emission component obviously weaker than red one. The remarkable change in the H$\alpha$ profile observed on 1994 April 27-28 implies the possible occurrence of rapid violent activity in the stellar emission envelope.

2. H$\alpha$ emission profiles of the star exhibit ultrarapid and as if cyclic changes. 16 spectra of the star were taken on 1994 April 28 (see Figure 2a). The H$\alpha$ displayed change with time. It is seen at a glance that, there were two red emission components varying in intensity. The bottom profile in Figure 2b represents the mean profile of these spectra, and the other which are formed by subtracting the mean profile from each spectrum, are the line profile residuals. It is obvious that its H$\alpha$ emission undergoes the ultrarapid changes on a time scale of minutes.

It can be seen from Figure 2b that the ultrarapid variations of the H$\alpha$ profiles resemble the moving bumps which have been observed at high-resolution and high-signal-to-noise-ratio in the absorption lines of some Be stars (Walker et al., 1979; Yang et al., 1990; Floquet et al., 1992, Bossi et al., 1993). At present, there were two interpretations for these line-profile variations in Be stars: photospheric non-radial pulsations (Vogt and Penrod, 1983), or corotating structures in the matter above the stellar photosphere (Harmanec, 1989; Gies, 1994). Our observations showed that the H$\alpha$ profiles had dramatic moving features but the phenomenon was not found in HeI $\lambda$6678. Therefore, we may infer that

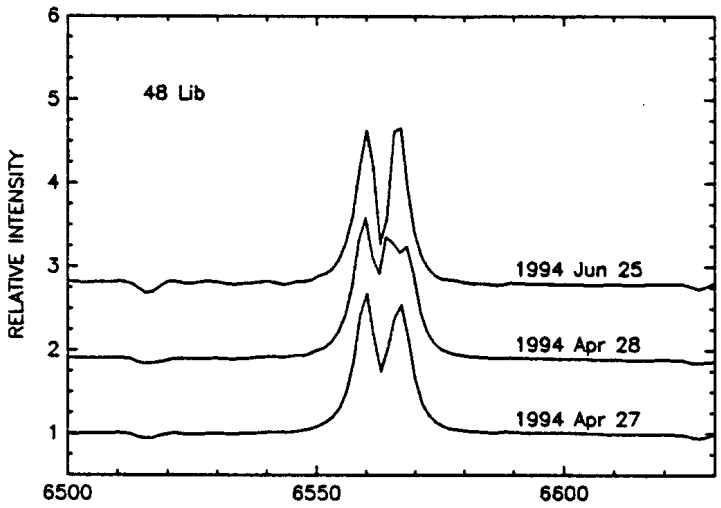


Figure 1

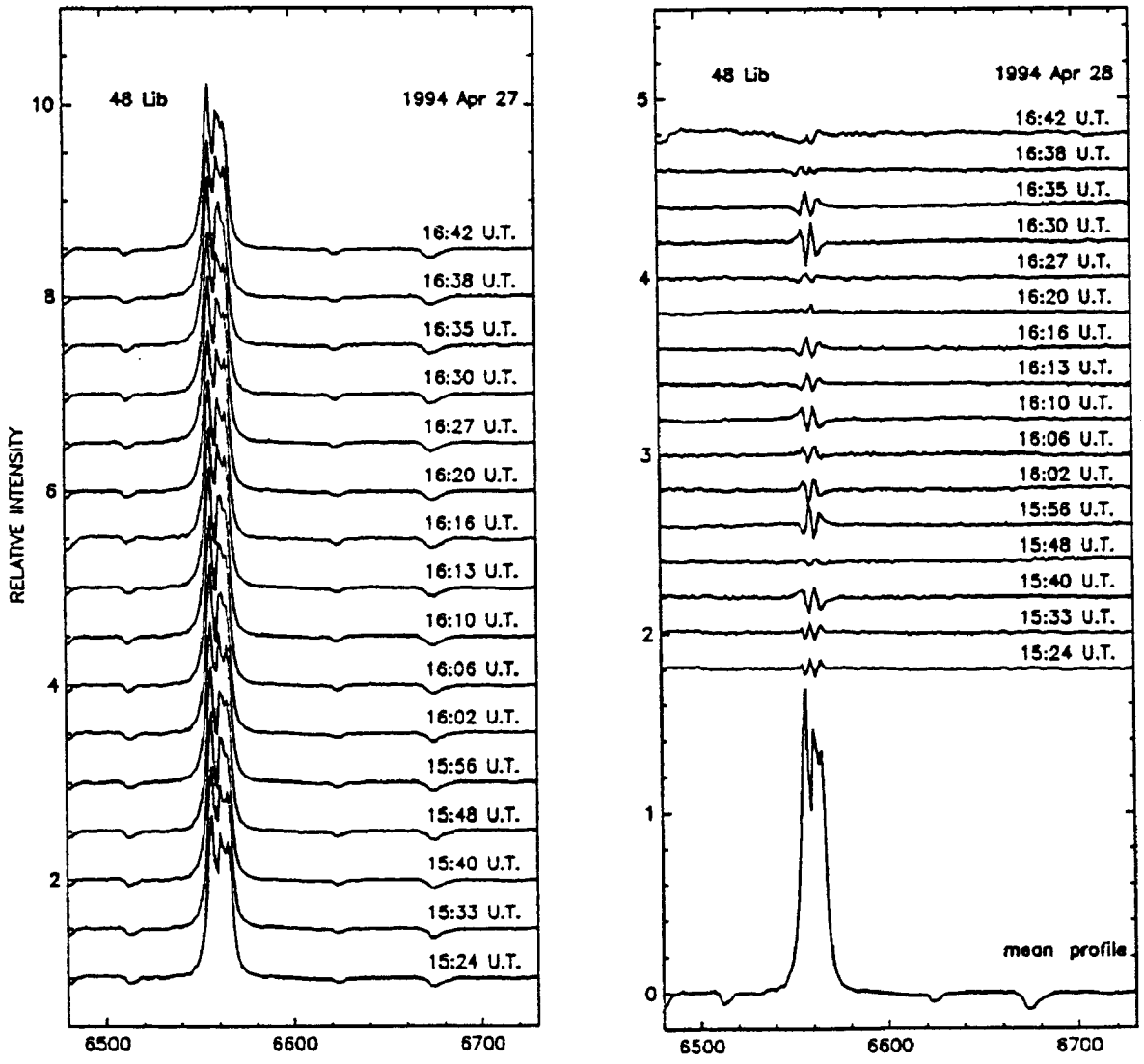


Figure 2

the H$\alpha$ line-profile variations could be due to the nonuniform distribution of the circumstellar matter. The nonuniform distribution of the circumstellar envelope is possibly related to the violent activity of the emission envelope in the star during 1994 April 27-28. Unfortunately, our resolution is considerably lower and observations are limited only to H$\alpha$ and HeI $\lambda$6678. In order to better understand the details of the variations and throughly investigate the nature of the variations, it is necessary to make high-resolution and high-signal-to-noise-ratio observations of different lines of interest at widely different wavelengths.

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